



CITY OF LODI

COUNCIL COMMUNICATION

AGENDA TITLE: New Radio Repeater System for Lodi Police Department, purchased with Asset Seizure Funds

MEETING DATE: March 3, 1993

PREPARED BY: Police Chief

RECOMMENDED ACTION: To approve the purchase of a new Radio Repeater System and installation of three new telephone circuits for a total cost of \$30,133.11 for the Police Department.

BACKGROUND INFORMATION: Captain Larry D. Hansen will be present to answer any questions the Council may have. Please refer to the attached informational memorandums.

FUNDING: Asset Seizure Funds in the amount of \$30,133.11.


Floyd Williams
Chief of Police

FAW:sm
cc: City Attorney

APPROVED



THOMAS A. PETERSON
City Manager



recycled paper

L O D I P O L I C E D E P A R T M E N T

M e m o r a n d u m

To: Floyd A. Williams
Chief of Police

From: Captain Larry D. Hansen
Patrol Division Commander

Date: February 23, 1993

Subject: RADIO REPEATER SYSTEM

As you are aware, City Council approved a special allocation from our Asset Seizure funds to purchase new weapons for the Lodi Police Department. Prior to making the purchase of these weapons, supervisors and officers expressed concern over spending money on weapons rather than on a new radio repeater system. We conducted a survey and determined that the majority of our personnel felt the radio reception was so poor, it deserved to be a higher priority than the purchase of weapons.

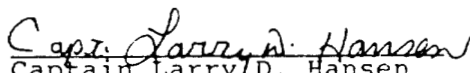
Lieutenant David Main did the research with Motorola and submitted a proposal for a new Radio Repeater System. This system should greatly enhance the ability of our officers to communicate on their portables. Many officers feel strongly that this is an officer safety issue.

The three radio repeaters will be placed on towers located at Lodi Fire Station #2 (705 E. Lodi Avenue), Lodi Fire Station #3 (2141 S. Ham Lane) and Woodbridge Fire Station on Augusta Street.

The cost of this system is \$27,985.11 for the equipment and \$2,148.00 for the three telephone circuits. In addition, there will be a monthly charge of \$137.04 for the 2001 Voice Grade 2-wire telephone lines. The total cost out of Asset Seizure funds for equipment and installation of telephone circuits is \$30,133.11.

NOTE: Please refer to attached memorandum from Lieutenant David Main and the proposal submitted by Motorola.

Respectfully submitted,


Captain Larry D. Hansen
Patrol Division Commander

LDH:jh

L O D I P O L I C E D E P A R T M E N T

M e m o r a n d u m

To: Captain Larry Hansen

From: David J. Main
Lieutenant *DJM*

Date: August 14, 1992

Subject: RADIO REPEATER SYSTEM

As I am sure you are aware, radio reception and transmission in south Lodi has been very poor, especially when using portable radios. It is not uncommon for it to be virtually impossible to transmit via portable radio south of Kettleman Lane. This creates a real officer safety hazard.

In exploring all of the possible solutions I find that most are very expensive, in excess of \$70,000.00. The easiest cure and probably the most cost effective, would be to install a satellite receiver voting station. In simpler terms this system acts as a repeater. I have outlined two different proposals for your review and consideration.

HOW THE SYSTEM WORKS:

Spectra Tac, Satellite Receiver Voting System is designed to enhance radio communication. A great deal of our radio communication is done on portable radios. Portable radios as you know without any type of a repeater system has very little talk out range, though the portable can easily pick up the powerful base station transmitter. The most practical way to increase this range is to supplement the base station receiver with a satellite receiver located within range of the portable radio. More receivers can be placed throughout a given area to insure that no matter where the user is, the portable can be picked up on one of these satellite receivers. This system is called a Total Area Coverage System.

This Total Area Coverage System basically through an internal process, compares and selects the best signal for transmission which is called receiver voting. It actually votes on the best signal.

I realize that funds are tight at the present time and I have tried to find the most cost effective system that would take care of our current problem.

PROPOSAL ONE:

To be able to really reap the benefits of a true voting station system then it is best to have more than one receiver. Based on the geographical lay out of our city, it is recommended that three satellite receiver locations be established. One in

south Lodi, (possibly at the Fire Station at West Lane and Armstrong) one in east Lodi, and one north. This would allow portable access to virtually every location within the city. I have included a total cost break down which is attached.

COST: \$ 31,750.00

PROPOSAL TWO:

The least costly method to correct the problem of poor portable radio transmission in south Lodi, is to install one receiver in south Lodi. The main problem with this method is that you are dealing only with south Lodi as opposed to the entire city, and that in order to have a true voting system there needs to be more than one receiver. It is true however than when you purchase this system that you are in actuality getting two receivers because there must be one installed at the base station.

The ideal situation is to have several receivers placed through out the city. However considering fiscal limitations this second proposal might be a temporary solution to the problem. Obviously proposal one is the most ideal.

COST: \$ 21,000.00

Respectfully Submitted,

David J. Main
Lieutenant

Proposa. 1

MOTOROLA COMMUNICATIONS & ELECTRONICS, INC.

B I D S P R E A D S H E E T

Prepared by: DAVID NAASZ

Date: 7/8/92

Customer: LODI POLICE DEPT.

Inv. No.

Address:

Opening date:

SPECTRATAC

ITEM	QTY.	DESCRIPTION	STD.UNIT	STD.TOTAL
1	3	C04RTB3108 TAC RX	\$3317.00	\$ 9,951.00
1A	3	C105 RX SERVICE MOD.	278.00	834.00
1B	3	C28 REVERTING	474.00	1422.00
1C	3	C12 RF AMP	98.00	294.00
1D	3	C192 RX HAND SET	129.00	387.00
2	3	TRN6342 BATTERY BRACKET	82.00	246.00
SUBTOTAL				\$13,134.00
3	1	T1786 DIGITAC COMPARATOR	2307.00	2307.00
3A	1	C195 41' CABINET	103.00	103.00
3B	4	C178 SOM	567.00	2268.00
3C	1	C175 KEYING MODULE	809.00	809.00
3D	1	C192 HAND SET	129.00	129.00

3E	1	C235 CONSOLE PRIORITY	618.00	618.00
3F	1	C238 CONSOLE INTERFACE	98.00	98.00
		COMPARATOR SUBTOTAL		\$6,332.00
4	3	TDE6712 5.5 DB GAIN	700.00	2100.00
5	3	TDN6599 1/2 FOAM 100 FT	450.00	1350.00
6	1	MICOR MODIFICATION		1523.00
		EQUIPMENT		\$24,439.00
		TAX		1,894.02
		FREIGHT		600.00
		TOTAL		\$26,933.02

2800.00

3,000.00

15,000.00



LODI POLICE DEPT
TAC SYSTEM INSTALLATION QUOTE

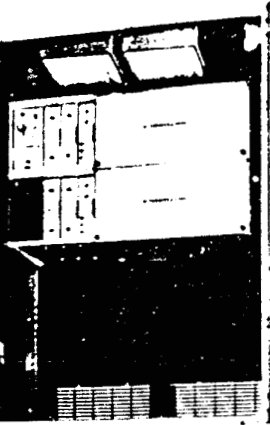
1. Install and optimize 3 sight TAC system. Receivers to be located at Lodi Fire station #2 and #3 and at Woodbridge station #1. \$2900.00

2. Install and optimize single receiver and comparator.
\$ 1500.00

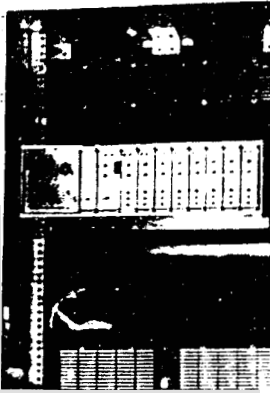
MOTOROLA

Spectra-TAC Satellite Receiver Voting System

132-174 MHz
406-420 MHz
450-512 MHz
806-821 MHz



Two receivers with optional emergency batteries: up to three receivers and batteries can be accommodated in this 30-inch Compa-Station cabinet.



Comparator with 8 Signal-Quality Modules to accept inputs of 8 satellite receivers; models with greater capacities available. Optional emergency battery system also available for the Comparator.

Spectra-TAC satellite receiver voting system

- Highest Audio Quality
- Maximum System Flexibility
- Easy Serviceability
- Solid State Integrated Circuit Reliability
- Data Handling Capability
- Status Tone 13 dB Below Audio

The Industry's First Receiver Voting System With:

- Path Loss Factoring
- Path Response Compensation
- Superior Receiver Shielding and Filtering
- "Smart" Notch Filter** — Does Not Degrade Voice

A user equipped with a portable radio has a limited talk-out range, though his receiver can easily pick up the powerful base station transmitter. A practical way to increase this range is to supplement the base station receiver with a satellite receiver located within range of the portable. More such receivers placed throughout a given area insure that no matter where the user is, the portable can be picked up on one of these satellite receivers. This setup constitutes a Total Area Coverage (TAC) system. The process of comparing and selecting the best signal when a portable reaches two or more satellites is known as receiver voting.

The Spectra-TAC satellite receiver voting system provides the user on foot with a dramatic increase in range and effectiveness of vital communications.

Receiver

The Spectra-TAC satellite receiver is an integrally packaged unit consisting of an RF-IF section, power supply, audio control module, and encoder module. Depending on system design, the unit can also house either a Digital Private-Line coded squelch module or a Private-Line tone-coded squelch module. To reduce unwanted interference, the RF-IF section is housed in a thoroughly shielded package with filtered inputs. This section of the receiver provides the basic receive functions. The power supply provides a constant regulated voltage to the unit, even through crucial periods of power brown-outs. The power supply also has the capability of charging an optional emergency battery, and of providing an alert signal if a power outage should occur. The Audio Control module and the Encoder module provide signalling information to the Compar-

ator. Signals from these modules also enable the system to compensate for varying phone line loss and poor frequency response, and to check for phone line outage.

Comparator

The Comparator evaluates the quality of the audio from the remote receivers and selects the receiver with the best audio.* This selection is a continuous process. The selected audio is then sent to a transmitter or to a dispatcher console, or to both, depending on system needs. The Comparator is modular in construction, with the basic unit accommodating a command module, a power supply and up to 8 Signal Quality Modules, which makes it capable of handling up to 8 remote receivers. Other models are available for greater system requirements. The Comparator power supply provides a constant regulated voltage to the unit. As with the receiver, the Comparator will continue to function during power company brown-outs, and the supply has the capability to charge an optional emergency battery which can power the unit if power fails. The command module provides the

necessary audio amplification required in the system. The Signal Quality Modules make continuous measurements of the received audio quality. Both comparison and reselection are continuous, a necessary feature since a user on patrol often moves from the best coverage area of one receiver into the best coverage area of another receiver.

Features • Benefits

Comparator

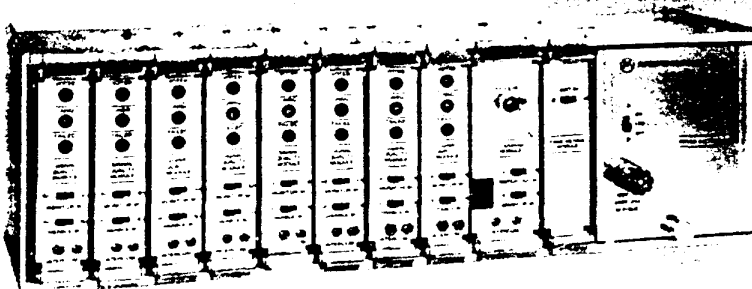
"Smart" Notch Filter.** Spectra-TAC satellite voting system features a "Smart" notch filter in the audio path that switches out whenever voice is present. • The elimination of all notch filters when voice is present results in the clearest, sharpest audio quality available. Not available with tone keying module.

Automatic Line Level Adjustment: • Prevents daily line changes from affecting the strength of the signal at the

* Provided input line sensitivity specification is met.

** The term "smart" refers to the module's sensing capability, not a filter used in some mobile telephone systems.

Comparator



Comparator. Line levels do not need to be readjusted constantly to reflect line changes.

Speed and Quality: The Comparator makes its first selection within 40 milliseconds with continuous selection occurring in less than 1 millisecond. Voting is accomplished with 2 dB steps. ● These features assure the best and most rapid audio quality selection.

Panel-Mounted LEDs: Provide Signal Quality Module status information ● indicating whether the receiver is voted, is unsquelched, or if there has been a failure.

Built-in Power Supply: ● Can be used with 120 or 240 volt, 50 or 60 Hz power sources, provides constant, regulated dc power to the Comparator even with significant drop in input voltage, as in power brown-out periods.

System Expansion Capability: Each Comparator chassis will handle up to 8 receivers. Additional Comparator models and Add-Comparator options are available to allow comfortable expansion to handle any feasible system requirement.

Line Outage Indication: Tells when a phone line has failed open or shorted.

Transient Protection: Prevents damage caused by phone line transients.

Light Emitting Diode Indicators: No light bulbs to replace.

-13 dB Status Tone: This continuous signalling tone (present when receiver is squelched) is set 13 dB below peak audio signal ● to maintain high audio quality while minimizing cross-talk and channel overloading on multiplex equipment.

Receiver

MICOR Radio Performance: ● The all solid-state Sensitron receiver, with its .35 μ V EIA SINAD sensitivity coupled with high selectivity and intermodulation rejection, ensures maximum system performance.

800 MHz Availability: ● All the advantages of Spectra-TAC receiver voting systems can now be applied to the clear spectrum of 800 MHz.

Full RF Shielding: ● Provides superior protection from RF interference at crowded sites.

Compact Size: The receiver package is designed for 19" (475 mm) rack mounting and is only 5 1/4" (131.25 mm) high. Several cabinet sizes are available to meet system needs.

Built-in Trickle Charger: ● Keeps optional battery charged for standby emergency operation.

Emergency Power Alert: ● A tone signal notifies the dispatcher that the receiver is on battery operation.

Built-in Equalizer: ● Provides correction for poor telephone line frequency response, maintains audio quality.

Built-in Test Oscillator included for Line Frequency Response Checks

Integral Power Supply: ● Provides 120/240V ac, 50/60 Hz operation.

Choice of Squelch: Models are available with Private-Line tone-coded squelch or with Digital Private-Line coded squelch.

IMTS Compatibility: ● All Spectra-TAC satellite receivers are fully compatible with Pulsar tone control IMTS systems, or optionally with DC control IMTS systems.

Options

Emergency Power and Alert is available on both the Receiver and Comparator for use in case of an AC power failure. The Receiver emergency power battery will supply 24 hours of operation for one Receiver/Encoder, while the Comparator emergency power battery will provide 8 hours of operation for a single Comparator chassis unit. Both have automatic battery recharge and notify the dispatcher of AC failure with periodic bursts of tone during receiver unsquelched periods.

Line Priority permits the control console in tone control systems to take over transmitter operation from the Comparator.

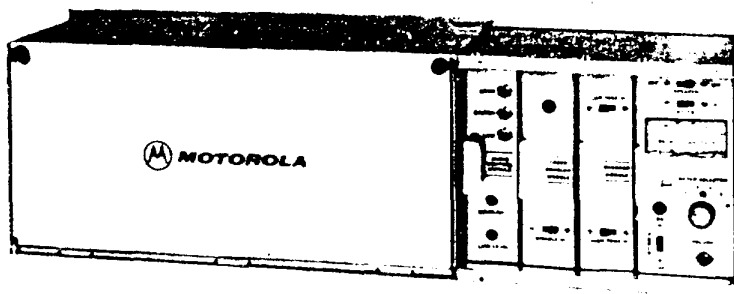
Secondary Line Driver allows the Comparator to act as a subcomparator in larger systems, or may be used to provide a second 600 ohm audio output.

Receiver Test Module allows the testing of all RF metering points, line level measurements, and a 20 dB quieting measurement. Local monitoring is provided by an integral 0.5 watt amplifier and speaker.

Receiver and Comparator Handsets: Provide system intercom capability.

Keying Modules: Provide tone and DC keying functions for repeater stations.

Receiver shown with optional test module installed.



Spectra-TAC satellite receiver voting system

Receiver-Encoder

ELECTRICAL		Timing Coded Squelch Receiver:	
Power Supply:	120/240V ac, 50-60 Hz Optional battery operation with automatic switchover and battery recharge.	Status tone is removed upon operation of the receiver's coded squelch switching circuit.	
Timing Carrier Squelch Receiver:		MECHANICAL	
Status tone is removed within 40 milliseconds after receipt of a 20 dB quieting signal.		Receiver/Encoder:	5 1/4" x 19" rack panel 131.25 mm x 475 mm
		Enclosures:	Indoor 30" cabinet holds up to 3 receiver-encoders and a multicoupler

Receiver	132-174 MHz	406-420 MHz 450-512 MHz	806-821 MHz
EIA Modulation Acceptance:	±7 kHz minimum	±7 kHz minimum	±8 kHz minimum
Selectivity— EIA SINAD:	—100 dB at ±30 kHz* —95 dB with preamp	—90 dB at ±25 kHz —90 dB with preamp	—80 dB at ±25 kHz
Oscillator Frequency Stability:	Channel element maintains oscillator frequency within ±.0005% from —30°C to +60°C ambient (+25°C reference) (±.0002% using AFC optional)	Channel element and AFC maintain oscillator frequency within ±.0002% from —30°C to +60°C ambient (+25°C reference)	Channel element maintains oscillator frequency within ±.00025% from —30°C to +60°C ambient (+25°C reference)
Sensitivity— 20 dB quieting:	WITHOUT PREAMP Less than 0.5 µV	WITHOUT PREAMP Less than 0.5 µV	WITHOUT PREAMP Less than 0.5 µV
EIA SINAD: (Per EIA RS204B)	WITH PREAMP Less than 0.35 µV	WITH PREAMP Less than 0.175 µV	WITH PREAMP Less than 0.175 µV
Intermodulation— EIA SINAD:	—80 dB	—75 dB	—85 dB
Spurious & Image Rejection:	100 dB minimum	95 dB minimum	100 dB minimum
Squelch Sensitivity— Carrier Squelch (adjustable):	0.20 µV or less at threshold	0.10 µV or less at threshold	0.25 µV or less at threshold
Coded Squelch (fixed):	0.20 µV or less	0.10 µV or less	0.125 µV or less
Audio Characteristics: Ref. EIA RS 204B 6dB/Oct. de- emphasis char- acteristics 300-3000 Hz	Telephone Line: Output: +11 dBm at 600 ohms, balanced Response: +1, —3 dB Distortion: 3% at 1000 Hz Hum & Noise: —55 dB For Local Speaker (opt.) Output Available: 1/2 watt at 16 ohms Response: +2, —8 dB Distortion: 5% at 1000 Hz Hum & Noise: —50 dB	Telephone Line: Output: +11 dBm at 600 ohms, balanced Response: +1, —3 dB Distortion: 3% at 1000 Hz Hum & Noise: —55 dB For Local Speaker (opt.) Output Available: 1/2 watt at 16 ohms Response: +2, —8 dB Distortion: 5% at 1000 Hz Hum & Noise: —50 dB	Telephone Line: Output: +11 dBm at 600 ohms, balanced Response: +1, —3 dB Distortion: 3% at 1000 Hz Hum & Noise: —55 dB For Local Speaker (opt.) Output Available: 1/2 watt at 16 ohms Response: +2, —8 dB Distortion: 5% at 1000 Hz Hum & Noise: —50 dB
RF Input Impedance:	Nominal 50 ohms	Nominal 50 ohms	Nominal 50 ohms

*85 dB @ 25 kHz

Comparator

ELECTRICAL	
Power Supply:	120/240V ac, 50-60 Hz 13.8V dc
Input Line Impedance:	600 ohms, balanced
Input Line Sensitivity:	—38 dBm for status tone —25 dBm at 1000 Hz
Output Line Impedance:	600 ohms, balanced
Output Audio Level:	Adjustable, +11 dBm max.
Output Audio Response:	±1 dB from 300 to 3000 Hz with voice transmission
Output Audio Distortion:	Less than 3% at 1000 Hz
Unselected Channel Rejection:	—50 dBm
Timing:	Initial selection within 40 milliseconds. Change of selection in less than 1 millisecond. Dropout delay adjustable, 10 seconds maximum
MECHANICAL	
Comparator Chassis:	5 1/4" x 19" rack panel 131.25 mm x 475 mm
Comparator Capacity:	8, 16 or 24 site inputs, depending upon model
Enclosures:	30" indoor Compa-Station cabinet (holds up to four comparator units).

System Attack Time

Carrier Squelch:	Audio is present at the output of the Comparator within 80 milliseconds after receipt of a 20 dB quieted signal.
Tone-Coded Squelch:	Audio is present at the output of the Comparator within 40 milliseconds after operation of the receiver's coded squelch switching circuit.

FCC Certification Numbers

132-174 MHz:	RC0107
406-512 MHz:	RC0108
806-821 MHz:	RC0134



Support Services

Wherever Motorola sells, our product is backed by service. In the U.S., we have 900 authorized or company owned centers. In addition, our products are serviced throughout the world by a wide network of company or authorized independent distributor service organizations.

Motorola is an Equal Employment Opportunity/Affirmative Action Employer.



MOTOROLA

1301 E. Algonquin Road, Schaumburg, Illinois 60196
Telephone (312) 397-1000

Specifications subject to change without notice

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BID SPI AD SHEET

MC OROLA
COMMUNICATIONS AND ELECTRONICS INC.

Prepared by:

David NASE

Date

5-5-92

Customer:

Codi Police Dept

Inv No

ATTN: G. MAN

Address

ITEM	QTY	DESCRIPTION				
* 1	1	COYR+BB10B			3317 00	
* 1A	1	C105 RX service mod			278 00	
* 1B	1	C28 Reverting			474 00	
* 1C	1	C12 RF AMP			98 00	
* 1D	1	C192 Hand set			129 00	
			SUB	total	4296 00	
* 2	1	+RN 6342 Battery Bracket			82 00	
3	1	+1786 Digital Comparison			2307 00	
3A	1	C195 Y1 cabinet			103 00	
* 3B	2	C178 SG mod			567 00	1134 00
3C	1	C175 Keying mod			809 00	
3d	1	C235 Console priority			618 00	
3E	1	C238 Console Int.			98 00	
			SUB	total	5069 00	
* 4	1	TDE6712 Antenna			708 00	
* 5	1	TDN 6599 1200 CAAX			450 00	
6	1	micron modification			1523 00	
			SUB	total	2673 00	
		one sign			13254 00	
		tax			102718	
		Fixed			325 00	
		in station			1500 00	
		total			16106 00	



MOTOROLA

Communications and Electronics Inc.
North America Group
Western Customer Division

Address Reply to

November 3, 1992

Lodi Police Dept.
230 West Elm St.
Lodi, CA 95240
Attn: Capt. Hansen
Lt. Main

Gentlemen:

Please find enclosed the updated SpectraTac system description and equipment list you requested.


This SpectraTac System will consist of 3 Spectratac receivers and one Spectratac comparator that will support Lodi PD channel one. These receivers will be located at Lodi Fire Stations 2, 3 and at Woodbridge Fire Station 1. The comparator will be located at the Lodi PD radio room on Elm St. Receive audio from these receivers will be routed to the comparator through the use of dedicated public telephone lines. It is the responsibility of the Lodi Police Dept. to supply these lines. Motorola will assist Lodi PD with phone line specification and interface at telephone company "D" mark locations at the TAC system sights. TAC receiver installation cannot be completed until these phone lines are installed and operational.

TAC receiver antennas will be installed on the hose towers at Lodi Fire stations 2, 3 and at Woodbridge Fire Station 1. Permission for these installations is the responsibility of Lodi PD Dept. (Motorola can assist if required).

Delivery of this equipment is 4 weeks ARO. Installation can begin upon equipment delivery. Payment terms are net 30 days from receipt of equipment.

Thank you for choosing Motorola as your communications system supplier.

Sincerely,
MOTOROLA
Communications & Electronics, Inc.


David Naasz
Account Executive

BID SPREAD SHEET

PREPARED BY: DAVID NAASZ

CUSTOMER: LODI POLICE DEPT./SPECTRATAC SYSTEM

ITEM	QTY	DESCRIPTION	UNIT PRICE	EXTENDED PRICE
1	3	C04RTB3108 TAC RX	\$2853.00	\$8,559.00
1A	3	C105 RX SERVICE MOD	\$ 278.00	\$ 834.00
1B	3	C28 REVERTING	\$ 474.00	\$1,422.00
1C	3	C12 RF AMP	\$ 98.00	\$ 294.00
1D	3	C192 RX HAND SET	\$ 129.00	\$ 387.00
2	3	TRN6342 BATTERY BRACKET	\$ 82.00	\$ 246.00
SUBTOTAL				\$11,742.00
3	1	T1786 COMPARATOR	\$1984.00	\$1,984.00
3A	1	C195 41' CABINET	\$ 103.00	\$ 103.00
3B	4	C178 SQM	\$ 567.00	\$2,268.00
3C	1	C175 KEYING MODUL	\$ 809.00	\$ 809.00
3D	1	C192 HAND SET	\$ 129.00	\$ 129.00

3E	1	C235 CONSOLE PRIORITY	\$ 618.00	\$ 618.00
3F	1	C238 CONSOLE INTERFACE	\$ 98.00	\$ 98.00
		COMPARATOR SUBTOTAL		<u>\$6009.00</u>
4	3	TDE6712 5.5 DB GAIN	\$ 700.00	\$2100.00
5	3	TDN6599 1/2 FOAM 100 FT.	\$ 450.00	\$1350.00
6	1	MICOR REPTR-MODIFICATION		\$1523.00
		EQUIPMENT TOTAL		\$22,724.00
		TAX		1,761.11
		FREIGHT		600.00
		INSTALLATION		2,900.00
		TOTAL		<u>\$27,985.11</u>